

REMARKS

Favorable consideration and allowance of the subject application are respectfully solicited in view of the foregoing amendments and the following remarks.

Claims 1-7 and 9-13 are pending in this application, with Claims 1, 10 and 11 being independent. Claim 13 is withdrawn from consideration. Claims 1, 9, 10 and 12 are amended herein. Claims 1 and 10 are amended herein to incorporate the features of Claim 8; and Claims 9 and 12 are amended herein to depend only on Claim 1. Accordingly, Claim 8 is cancelled herein without prejudice to or disclaimer of its subject matter. It is submitted that no new matter has been added by the amendments herein.

W/D
Claims 1, 4-7 and 10 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over EP 1 048 480 A1. Since Claim 8 was not rejected over this reference, and since the subject matter of Claim 8 is now incorporated into Claims 1 and 10 (and indirectly, into Claims 4-7), this rejection is moot and should be withdrawn.

Claims 1-5, 8-9 and 11-12 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Hirose et al. (U.S. Patent No. 6,203,899). Applicants respectfully disagree with this rejection as applied to the present claims.

Before addressing the merits of the rejection, Applicants believe it will be helpful to review some features and advantages of the present invention as recited in Claims 1 and 11, the independent claims rejected over Hirose et al. As recited in amended Claim 1, the present invention relates to an ink-jet recording medium having at least a light-reflecting layer and a dye-fixing layer formed in this order on a base material in a multilayer structure. The light-reflecting layer contains two or more pigments that are different in chemical composition. The average

particle size of a pigment (A) having the highest liquid absorbency in the pigments is smaller than the average particle size of a pigment (B) having the lowest liquid absorbency in the pigments. The dye-fixing layer comprises not less than 70 mass percent alumina hydrate particles.

Claim 11 is of similar scope, but specifies that the light-reflecting layer contains an aluminum pigment and a silica pigment and that the average particle size of the aluminum pigment is smaller than the average particle size of the silica pigment. Claim 11 further recites that the surface of the dye-fixing layer has a 20°-glossiness of not less than 20%.

The recording medium uses pigments (A) and (B) as recited in Claim 1 in order to have sufficient ink absorbency and to provide the advantage that there is no waviness on the surface of high-density recorded portions, even when the recording medium is used in full-color ink jet recording. (See page 36 of the specification.) The mechanism by which pigments (A) and (B) provide the benefits of the invention is believed to be as follows. (See page 23, line 16 to page 25, line 5, of the specification.)

The reflecting layer is mainly made up of pigment (B), the particle shape and the reflectivity of which is hardly affected by absorption of moisture or by contact with the ink. Thus, the recording medium maintains its surface smoothness, even after reception of the ink, with its high reflectivity maintained at the interface with the transparent dye-fixing layer.

However, use of only the pigment (B) may produce the adverse effects of swelling of the base material and waviness of the recording medium, due to the lower liquid-absorbency (solvent-retaining property) of pigment (B), resulting in penetration of the solvent into the fibrous base material.

Use of pigment (A) improves the liquid absorbency of the reflecting layer itself to obtain higher ink absorbency. The dye-fixing layer can thereby be made thinner to improve the production efficiency and to decrease the production cost.

The particles of pigment (A) are smaller in size than the particles of the pigment (B). Therefore, the particles of pigment (A) enter the interspaces of the particles of pigment (B) and cause swelling. This holds the solvent and retains the shape of the reflecting layer. In contrast, in the case where pigment (A) has a larger particle size than pigment (B) as described in Japanese Patent Application Laid-Open No. 2001-10222, the particles of pigment (A) that have absorbed the solvent swell by themselves to lose the above-noted effects of surface smoothness (even after reception of ink) with maintenance of high reflectivity at the interface.

Furthermore, the reflecting layer, which has a high liquid absorbency, retards penetration of the solvent into the fibrous base material, thereby preventing swelling of the base material and preventing waviness of the printed portion of the recording face.

The presence of the smaller particles of pigment (A) in the interspaces of the particles of pigment (B) improves the surface smoothness of the reflecting layer, and consequently gives higher smoothness of the dye-fixing layer formed on the reflecting layer.

In Applicants' view, the cited reference does not teach or suggest the claimed invention. Hirose et al. mentions that the ink-receiving layer (which the Examiner notes is equivalent to the light-reflecting layer of the present invention) contains one or more pigments and gives a preferable particle diameter range of from 0.1 to 20 μm . Therefore, it does not teach or suggest use of pigments (A) and (B) having the size relationship as defined in Claims 1 and 11.

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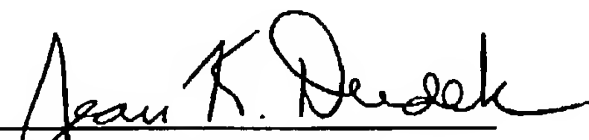
It is further submitted that Ichioaka et al. (U.S. Patent No. 6,177,188), which has been made of record but not relied upon, does not teach or suggest the claimed invention, either.

Applicants thus conclude that the cited references do not teach or suggest the features of the present invention as recited in Claims 1, 10 and 11, and Applicants submit that the present invention is patentably defined by independent Claims 1, 10 and 11. The dependent claims are allowable for the reasons given regarding Claim 1, as well as for the patentable features recited therein. Individual consideration of the dependent claims is respectfully solicited.

Applicants submit that the instant application is in condition for allowance. Favorable reconsideration and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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Recording material for ink-jet printing, comprises support coated by layer of barium sulfate with an overlayer of alumina, provides high color density

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Patent Family:

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EP 1048480	A1	20001102	EP 99108448	A	19990430	200103 B
AU 200028911	A	20001102	AU 200028911	A	20000420	200103
JP 2001010222	A	20010116	JP 2000130432	A	20000428	200107
CN 1272430	A	20001108	CN 2000117949	A	20000428	200114

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Patent Details:

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AU 200028911	A		B41M-005/00
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CN 1272430	A		B41M-005/00

Abstract (Basic): EP 1048480 A1

NOVELTY - Recording material for ink-jet recording methods consists of a carrier that has a pigment-containing layer deposited on it. This layer comprises at least one underlayer containing barium sulfate (I) and an overlayer containing (i) alumina as pigment or (ii) a mixture of at least two pigments.

USE - (A) are used to record ink-jet images.

ADVANTAGE - (A) is a glossy material that can generate images with high color density; has high ink absorbancy, short drying times and good resistance to wiping. When the underlayer also includes alumina or silicic acid, the coating weight of this layer may be reduced, avoiding the 'crack' effect and problems of dusting, and adherence of the coating is improved.

pp; 9 DwgNo 0/0

Title Terms: RECORD; MATERIAL; INK; JET; PRINT; COMPRISE; SUPPORT; COATING; LAYER; BARIUM; SULPHATE; OVERLAY; ALUMINA; HIGH; COLOUR; DENSITY

Derwent Class: A97; G05; P75; T04

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International Patent Class (Additional): B41J-002/01